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# FLORAE MALESIANAE PRAECURSORES LXVII
# MELIACEAE (DIVERS GENERA)

D. J. MABBERLEY

Department of Plant Sciences, South Parks Road, Oxford, England*

## SUMMARY

Skeletal revisions (generic delimitations, keys, specific distinctions, synonymy and typifications) are presented of the Malesian genera *Anthocarapa* (1 or 2 species with one new combination), *Aphanamixis* (3 species), *Lansium* (3 species with one new combination), *Reinwardtiodendron* (7 species with two new combinations) and *Sandoricum* (5 species of which one is new, *S. caudatum*). Special attention is given to the problems of taxonomy in the cultivated races of *Sandoricum koetjape* and *Lansium domesticum* and in the complex which is *Aphanamixis polystachya*. All names published in these genera and *Pseudocarapa* are disposed of, two in the last being transferred to *Dysoxylum*, leaving *Pseudocarapa* monotypic.

## INTRODUCTION

In terms of generic diversity, the region richest in Meliaceae is Indomalesia and the western Pacific. The two major subfamilies (the other three are very small and restricted to Madagascar) are represented by fifteen genera in Melioideae and three in Swietenioideae. The former is represented by all seven tribes recognized by Pennington & Styles (1975) and the latter by all its three. Although no genus, with the possible exceptions of *Sandoricum* and *Lansium*, now widely planted beyond their presumed native ranges, and that represented by the shrublet known as *Turraea breviflora* Ridley (a Malayan endemic of obscure affinities), is strictly restricted to Malesia, the tribes Aglaieae, Sandoriceae and Vavaeeae are restricted to Indomalesia and the western Pacific as are some 75% of the genera found there, viz. *Aglaia, Anthocarapa, Aphanamixis, Azadirachta, Chisocheton, Chukrasia, Cipadessa, Dysoxylum, Lansium, Munronia, Pseudocarapa, Reinwardtiodendron, Sandoricum, Soymida, Sphaerosacme* and *Walsura*. *Melia, Turraea, Naregamia* and *Xylocarpus* extend to Africa, *Toona* to Australia and *Trichilia*, as presently understood, is pantropical. Of these, *Soymida, Sphaerosacme* and *Naregamia* do not occur in Malesia.

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Of the Malesian genera, three are outstandingly large: *Aglaia, Chisocheton* and *Dysoxylum*. A monograph of *Chisocheton* has been published (Mabberley, 1979) with new records and clarifications (Mabberley, 1982) and monographs of the other two are to be published shortly. Revisions of *Azadirachta* (Jacobs, 1961), *Toona* (Bahadur, unpubl.), *Vavaea* (Pennington, 1969) and *Xylocarpus* (Mabberley, 1982) have been prepared and monotypic genera, or those represented by one or two species in Malesia, viz. *Chukrasia, Cipadessa, Munronia* and *Turraea* will be dealt with directly in the 'Flora Malesiana' account. A review of *Melia* in Asia and the Pacific is published (Mabberley, 1984), while the problems of the generic limits of *Trichilia* and *Walsura* will be dealt with elsewhere. Besides this latter problem, the generic limits as set out by Pennington & Styles (1975) have been found to hold except that *Megaphyllaea* is now included in *Chisocheton* (Mabberley, 1979), while the *Anthocarapa/Pseudocarapa* issue is dealt with below. Besides clarification of this last, there remain only *Aphanamixis, Lansium, Reinwardtiodendron* and *Sandoricum* (Melioideae), which include some of the most frequently encountered species of Malesian Meliaceae, to be considered.

The purpose of this paper, then, is to cover those issues relating to these genera which would be inappropriate in the text of 'Flora Malesiana', which account has been prepared in tandem with it. Here, then, are 'skeletal' revisions excluding full descriptions and literature citation for Malesian species which will appear in the 'Flora Malesiana' but including typifications and other matters that will not.

## 1. ANTHOCARAPA AND PSEUDOCARAPA (GUAREEAE)

Species referred to these two genera, which are closely allied to *Dysoxylum*, were first included by C. de Candolle in his sect. *Pseudoguarea* (1878) of *Amoora* Roxb. (= *Aglaia* Lour.). Later *Amoora championii* (Thw.) C. DC. of Sri Lanka was removed to a new genus, *Pseudocarapa* Hemsl. (1894), and *A. balansaeana* C. DC. and *A. vieillardii* C. DC. of New Caledonia to a second one, *Anthocarapa* Pierre (1897). Pierre thought that the remaining species of De Candolle's original concept of sect. *Pseudoguarea, Amoora nitidula* Benth., described from Australia, might also be referred to his new genus, a view endorsed by Harms (1940). The circumscription of *Anthocarapa* and *Pseudocarapa* as set out by Harms has been followed by Pennington & Styles (1975), who argue that the inclusion of *Amoora nitidula* in *Pseudocarapa* by Merrill & Perry (1940) was a mistake.

In 1886, De Candolle added two more species to his sect. *Pseudoguarea: Amoora salomoniensis* and *A. naumannii*. These were described from materials collected by F.C. Naumann on the voyage of the Gazelle (1874–76) and probably now destroyed, the first set having been deposited at Berlin. Both species were referred to *Xylocarpus* Koenig by Harms (1940). Except for its 3-locular, rather than 4-locular, ovary, *Amoora salomoniensis* fits *Xylocarpus granatum* Koenig quite well, but, as Noamesi (1958) has pointed out, the original description of *Amoora naumannii* re-

fers to imparipinnate leaves and to flowers 1 cm long, features which would exclude it from *Xylocarpus*. Furthermore, the ovary has two superposed ovules per locule, an orbicular stylehead, an entire calyx and leaflets up to 19 × 16 cm, all of which are also incompatible with that disposition. However, the illustration provided by De Candolle in 1890 in the account of the botany of the voyage (Bot. Ergebn. Forschungsreise Gazelle, t. 10) is labelled *Amoora naumannii* but resembles *Xylocarpus rumphii* (Kostel.) Mabb. (*X. moluccensis* auctt., non M.J. Roemer; see Mabberley, 1982), and does not match the description, though it would explain why Harms reduced it to '*X. moluccensis*'. The confusion may have come about through a mixing of collections or labels, for Naumann's gatherings are unnumbered and he did collect '*Carapa moluccensis*' (i.e. *X. rumphii*) in both New Ireland and New Guinea, in the latter on the day after *Amoora naumannii* was collected. The description of *A. naumannii* best fits *Dysoxylum*, but, so far, its exact identity is obscure.

Merrill & Perry (1940) added a new species to *Pseudocarapa* when describing *P. papuana* from New Guinea, from which island Harms (1942) added *P. inopinata*. Harms (1942) referred the first to *Aglaia* but Pennington & Styles (1975) considered that it probably belongs in *Anthocarapa*, but they had no fruit to hand. With more adequate material, it is clear that it is referable to a group of small-flowered *Dysoxylum* species of New Guinea and, indeed, provides the earliest epithet for *D. micranthum* Merr. & Perry (1941):

**Dysoxylum papuanum** (Merr. & Perry) Mabb., *comb. nov.*

*Pseudocarapa papuana* Merr. & Perry, J. Arn. Arbor. 21 (1940) 315. – *Aglaia papuana* (Merr. & Perry) Harms, Bot. Jahrb. 72 (1942) 161. – Type: *Clemens 3073* (A, holo; L), Papua New Guinea, Morobe District, Sattelberg, 1100 m, 9 May 1936.

*D. micranthum* Merr. & Perry, J. Arn. Arbor. 22 (1941) 257. – Type: *Brass 3114* (A, holo), Solomon Islands, San Cristobal, Star Harbour, 1100 m, Oct. 1932.

*Pseudocarapa inopinata* was unknown as specimens to Pennington & Styles (1975). Whilst visiting the Berlin herbarium, I checked unnamed Meliaceae, Burseraceae and Anacardiaceae to try to find undistributed duplicates of Harms's numerous syntypes. In all three families there were fruiting materials of these and they match fruiting and flowering materials of a common *Dysoxylum* of New Guinea, hitherto without a name:

**Dysoxylum inopinatum** (Harms) Mabb., *comb. nov.*

*Pseudocarapa inopinata* Harms, Bot. Jahrb. 72 (1942) 160. – Type: of Harms's surviving isosyntypes, I select *Ledermann 8703* (B, lecto), Papua New Guinea, Sepik, 'Aprilfluss', 14 Sept. 1912.

Thus, *Pseudocarapa* has been reduced in size to a monotypic genus of Sri Lanka, closely allied to *Dysoxylum* but differing from it and from all other Meliaceae in

having pollen shed in tetrads. Pennington & Styles suggest that the species represented by *Loher 255* from the Philippines might belong in *Pseudocarapa* although it does not have such pollen. Examination of this collection (K, M) shows that the leaves match those of *Anthocarapa* species, but differs from all material referred to that genus below in having four petals. The collection is from Arayat (15°12'N, 120°45'E), Luzon, though I have seen no other material from the Philippines. Indeed, the closest locality for any *Anthocarapa* species is southern Sulawesi and Lesser Sunda Islands as well as northwest New Guinea (it is possibly of some interest that Loher also made collections in New Guinea but the earliest ones so far known were not made until 1910, whereas the *Anthocarapa* is clearly labelled June 1896). It possibly represents a second species of *Anthocarapa* bringing that genus even closer to *Dysoxylum*.

In summary, *Anthocarapa* (Philippines to New Caledonia, 1 or 2 species) and *Pseudocarapa* (Sri Lanka, monotypic) are distinct, while the remaining two species placed by De Candolle in his sect. *Pseudoguarea* are probably referable to *Xylocarpus* and *Dysoxylum* and the extraneous elements inserted into *Pseudocarapa* by Merrill & Perry and by Harms are referable to *Anthocarapa* and *Dysoxylum*.

## ANTHOCARAPA

*Anthocarapa* Pierre, Fl. For. Cochinch. 5 (1897) sub t. 343; Pennington*, Blumea 22 (1975) 500, t. 13b, c. – Type (selected by Pennington, l.c.): *Anthocarapa balansaeana* (C. DC.) Pierre.
*Amoora* Roxb. sect. *Pseudoguarea* C. DC. in DC., Mon. Phan. 1 (1878) 590, p.maj.p. – Type (selected here): *Amoora balansaeana* C. DC.

Trees with paripinnate leaves. Indumentum of simple hairs. Flowers unisexual, in axillary thyrses. Calyx 4- or 5-lobed. Petals 5, free, imbricate. Staminal tube ± cyathiform, 10–12-lobed; anthers inserted within throat. Disk in male flowers thick, fleshy, annular to patelliform, in female flowers small, annular and confined to base of ovary. Ovary (2- or) 3-locular; loculi uniovulate; stylehead discoid. Fruit a 2- or 3-valved, loculicidal capsule; pericarp thick and somewhat woody. Seed with a non-vascularized sarcotesta; embryo with thick collateral cotyledons, radicle superior, included.

Distribution. One, or possibly two, species from eastern Malesia to the western Pacific.

In view of the rich holdings of material at K, L and P, the three species referred to this genus by Harms (1940) and the variety of *Pseudocarapa nitidula* described by Merrill & Perry in the same year seem to me to be inadequately differentiated to be recognized as separate species, the alleged differences hinging on leaflet size and number in the main, though material from Malesia and the Solomon Islands almost always has wide leaflets while in New Caledonia and Australia forms with narrower leaflets are far more common.

* Subfam. Melioideae is the work of T. D. Pennington (B.T. Styles, pers. comm.).

## 1. Anthocarapa nitidula (Benth.) Pennington in sched. ex Mabb., *comb. nov.*

*Amoora nitidula* Benth., Fl. Austr. 1 (1863) 383. – *Pseudocarapa nitidula* (Benth.) Merr. & Perry, J. Arn. Arbor. 21 (1940) 315. – Type: of Bentham's syntypes, I here select *W. Hill s.n.* (K, lecto), Australia, Queensland, Moreton Bay.

[*Carapa moluccensis* sensu Span., Linnaea 15 (1841) 183, quoad spec., p.p.]

*Amoora balansaeana* C. DC. in DC., Mon. Phan. 1 (1878) 590, '*balanseana*'. – *Anthocarapa balansaeana* (C. DC.) Pierre, Fl. For. Cochinch. 5 (1897) sub t. 343. – Type: of De Candolle's syntypes, I here select *Balansa 3309* (G-DC, lecto; P), New Caledonia, Tchiaor de Balade, 500 m, 15 April 1871.

*Amoora vieillardii* C. DC., l.c. – *Anthocarapa vieillardii* (C. DC.) Pierre, l.c. – Type: *Vieillard 2431* (G-DC, holo; K, P), New Caledonia, Wagape, 1861-7.

*Dysoxylum oubatchense* Harms, Bot. Jahrb. 39 (1906) 144. – Type: *Schlechter 15550* (B, lost, holo; BM, E, G, K, L), New Caledonia, mountains near Oubatche, c. 600 m, 23 Dec. 1902.

*Pseudocarapa nitidula* var. *latifolia* Merr. & Perry, J. Arn. Arbor. 21 (1940) 315. – Type: *Brass 6492* (A, holo; BM, L), Papua New Guinea, Western Div., Madabuan.

Distribution. Philippines (Luzon; ? a second species with 4-petalled flowers), Sulawesi (Djampea), Lesser Sunda Islands (Timor, Flores), New Guinea, Solomon Islands, New Hebrides, New Caledonia, Australia (Queensland, New South Wales).

N.B. Collections made by Irving (*745, 746* at L) in Queensland indicate that trees may be male or monoecious, though male flowers fall rapidly in the latter making the trees appear female and the species dioecious.

### 2. APHANAMIXIS (AGLAIEAE)

The genus *Aphanamixis* extends from the Sub Himalaya tract and Sri Lanka eastwards throughout tropical Asia and Malesia to New Guinea and the Solomon Islands. One species, *A. sumatrana* of Sumatra and the Malay Peninsula, is distinct in having three anthers, the rest of the species having (five) six (eight). In Borneo and the southern Philippines, *A. borneensis* is distinct in its conspicuously looped venation and long petiolules. The rest of the genus comprises a nerve-wracking complex of reticulately related forms as follows.

At its most easterly, the genus is represented in the Solomon Islands by small to medium trees to 10(–20) m with rather slender twigs, bronze-red to orange-yellow flowers and rather delicate infructescences with crowded fruits. The trees often have crooked boles. Less frequently collected there, are rather more robust specimens, sometimes with myrmecophilous twigs. The first correspond to *A. lauterbachii* Harms, a species described from mainland New Guinea, where this form is recorded from the northern and eastern parts of the island (e.g. Sepik, Morobe, Central Dist., Papua). In New Guinea are also found the myrmecophilous forms, often much stouter than those in the Solomons, and their twigs are often pale brown *in sicco*, and curiously twisted and irregular at their apices. These tend to have larger flowers which are creamy yellow or white. Such forms have been recorded from over almost all the island and are linked by a number of intermediate specimens to *A. lauter-*

*bachii*, though at first appearing completely distinct. The myrmecophilous form has been named *A. myrmecophila* (Warb.) Harms. Some myrmecophilous forms differ from that in being distinctly pubescent as in the treelet *Brass 25583* from Normanby Island, Papua, while other hairy forms have no ants and have been recorded from West New Guinea, W. Sepik and Morobe District, though linked by specimens from West New Guinea, such as *Kanehira & Hatusima 12486* (BO) from Sennen, Nabire. These are the principal variants at low altitudes, though some of them, notably the more congested forms of '*A. myrmecophila*' are found up to 1000 m or more. In the Highlands, however, there are apparently completely distinct-looking treelets, often only 2 m or so high, with long-pedicellate flowers and a characteristic net-like venation. These have been named *Amoora sogerensis* Bak. f. (Central District, Papua), *Aphanamixis schlechteri* Harms (North-east New Guinea), *Aglaia janowskyi* (Irian Jaya). They are found from c. 900 to 1600 m, are often associated with montane oak forests, and have been recorded from the Vogelkop and Eastern Highlands as well. Their flowers are yellowish but pedicellate forms are known from the lowlands, too, e.g. *NGF 45887* from Madang District, a specimen with the distinctive venation. Besides these forms, there is a widespread one, rather intermediate in features between *A. lauterbachii* and *A. myrmecophila*, without ants and subglabrous. This is the form which is found in the Moluccas and Lesser Sunda Islands (*A. timorensis* A. Juss.), Philippines and western Malesia to Sri Lanka.

In the Philippines, forms with large leaflets are indistinguishable from *A. grandifolia* Bl., described from Java, and this, too, is part of the variable *A. polystachya* (Wall.) R.N. Parker (Mabberley, 1982). In the Philippines, as in New Guinea, there are densely pubescent forms (*A. cumingiana* (C. DC.) Merr.; *A. pinatubensis* Elmer; *A. velutina* Elmer), which are rather robust but are linked to more typical *A. polystachya* by subglabrous forms as in the New Guinea case. Occasional hairy specimens are also known from Java but those from the Philippines are most striking in that sometimes they have not only simple hairs but also basally bifid or even stellate ones, and often a mixture of these.

In Java, Sumatra, the Malay Peninsula and Borneo, the species is, relatively speaking, rather homogeneous, but in mainland Asia, there are a number of precocious forms (e.g. *Amoora megalophylla* C. DC. var. *frutescens* C. DC.) and also sporadic variants with pedicellate flowers (*Amoora beddomei* Kosterm.) from South India.

The perplexing variation pattern is one in which subdivision based on habit, indumentum, flower-colour or pedicel length cannot use correlated characters throughout the range of the complex and, in general, the principal variants have no clear geographical integrity. That these plants should be treated as one species was independently suggested almost 40 years ago (Corner, 1946, p. 189 f.n.). The variation pattern rather resembles that in *Vavaea amicorum* Benth. analyzed by Pennington (1969), where features of indumentum, leaf-shape, petiole-length and inflorescence-length were found to be similarly uncorrelated and the principal areas of variation were also found to be New Guinea and the Philippines as well as the Solomon Islands, but also Fiji where *Aphanamixis* does not occur. In New Guinea, where such patterns are not infrequently found in quite unrelated groups of plants, similar is

seen in *Chisocheton*, in the *C. lasiocarpus* (Miq.) Val. complex. In that group, however, the majority of specimens may be grouped into entities, between which there are rather fewer intermediates than in the cases of *Aphanamixis* or *Vavaea*. I have afforded those informal status. I have not attempted such a grouping in *Aphanamixis polystachya* and suggest that, as in the case of *Chisocheton patens* Bl. (Mabberley, 1979), where a similar pattern is found in the Philippines and in the Malay Peninsula, the oldest binomial be used for the complex but at the local level it may be valuable to recognize different forms at whatever rank seems most appropriate there. In the Solomons, for instance, it may be valuable to indicate that the widespread form '*lauterbachii*' is in general rather different from other Papuasian forms, while in New Guinea, '*sogerensis*' seems in many cases quite distinct from the widespread lowland '*myrmecophila*' and what comes very close to typical '*polystachya*'. In the Philippines, the stout stellate-hairy forms may be distinguished from the rest as '*cumingiana*', and so on.

*Aphanamixis* is extremely closely allied to *Aglaia* Lour. in which genus it was included by Pellegrin (1910), who also included *Lansium* Correa, which differs from *Aphanamixis* in its ramiflory or cauliflory, its leaves not being imparipinnate, its five petals and in its berry. *Aphanamixis* resembles *Sphaerosacme* Wall. ex Royle*, a monotypic Himalayan genus, in having cotyledons united throughout their length but differs in that *Sphaerosacme* has five petals and two rows of anthers and its 5-locular ovary has uniovulate locules. The only macroscopic character which holds absolutely in keeping *Aphanamixis* separate from the variable genus *Aglaia* is that of the unity of the cotyledons, though there are many species of *Aglaia* which have, as yet, not been examined for this character. *Aphanamixis* comes very close to the group of species formerly segregated as the genus *Amoora* Roxb., in which Roxburgh put the Indian form of *Aphanamixis polystachya* and, even in 1982, a form of that species was described anew. This group of *Aglaia* species has a non-simple indumentum, albeit frequently very sparse, however, whereas most specimens of *Aphanamixis* have simple hairs, though the hairy forms of *A. polystachya* from the Philippines often have stellate hairs. In other genera, in the family, e.g. *Trichilia, Chisocheton* and *Dysoxylum*, species with stellate hairs are included with species with simple hairs. Should any *Aglaia* be found with united cotyledons, the status of *Aphanamixis* as a distinct genus would become rather dubious.

The earliest name for the genus may be *Ricinocarpodendron* Boehmer, formerly referred to *Dysoxylum* from which it has been lately excluded (Mabberley, 1982), but the plant on which the genus is based is known only from a rather crude drawing and a short description. However, the cotyledons are not as united as in typical *Aphanamixis*, as has been pointed out to me by F. White (in litt.) and, if that feature is accurately recorded, it is possible that the name is applicable to one of the *Amoora*-type *Aglaia* species which are, as we have seen, very close indeed to *Aphanamixis*. Fortunately, the name *Aglaia* Lour. is conserved.

* Ill. Bot. Himal. Mts (1835) 142. – Type: *Sphaerosacme fragrans* Wall. ex Royle (nom. illeg. = *S. decandra* (Wall.) Pennington).

## APHANAMIXIS

*Aphanamixis* Bl., Bijdr. (1825) 165; Pennington, Blumea 22 (1975) 485. – *Amoora* Roxb. sect. *Aphanamixis* (Bl.) C.DC. in DC., Mon. Phan. 1 (1878) 579. – Type: *Aphanamixis grandifolia* Bl.

*Andersonia* Roxb., Hort. Beng. (1814) 87, nom. nud., p.p.; Fl. Ind. ed. Carey 2 (1832) 212, non R.Br. (1810). – Type: *Andersonia rohituka* Roxb.

[*Sphaerosacme* Wall., Cat. (1829) n. 1277, nom. nud., non Wall. ex Royle (1835).]

[*Chuniodendron* Hu, J. Roy. Hort. Soc. 63 (1938) 387, nom. nud.]

? *Ricinocarpodendron* Boehm. in Ludw., Defin. Gen. Pl. (1760) 512, cf. Mabb., Malays. For. 45 (1982) 452.

Trees or pachycaul treelets with cicatrose twigs. Indumentum of simple or sometimes bifid and stellate hairs. Leaves imparipinnate, leaflets opposite. Inflorescences axillary to supra-axillary, male flowers in panicles, female and hermaphrodite in long spikes or racemes, rarely panicles. Male flowers distinctly smaller than others. Calyx deeply 5-lobed, lobes imbricate. Petals 3, imbricate, united with staminal tube basally. Staminal tube globose to deeply cyathiform; anthers 3–8, glabrous, inserted within tube. Disk 0. Ovary 3- (or 4-)locular, loculi with (1) 2 collateral to superposed ovules; style stout; stylehead conical to truncate, 3-angled or with impressions of anthers. Fruit a 2- or 3- (4-)valved loculicidal capsule, loculi 1- or 2-seeded. Seeds arillate; cotyledons plano-convex, collateral, united; radicle small, superior, included.

Distribution. Three very closely related species from Sri Lanka and India to tropical China, Indochina and throughout Malesia to the Solomon Islands.

### KEY TO THE SPECIES OF APHANAMIXIS

1a. Small treelet, often unbranched and flowering when 1 m tall; leaflets ± equal at base; anthers 3 (Malay Peninsula, Sumatra) . . . . . . . . . . . . . . **3. A. sumatrana**

b. Tree or treelet to 20(–35) m; leaflets ± markedly asymmetric, anthers 6 . . . 2

2a. Veins conspicuously looped well clear of margin; petiolules 15–30 mm, the terminal one to 45 mm (Borneo, S. Philippines) . . . . . . . . . . . . **2. A. borneensis**

b. Veins not so; petiolules 4–10 mm, the terminal one to 15 mm **1. A. polystachya**

### 1. Aphanamixis polystachya (Wall.) R.N. Parker

*A. polystachya* (Wall.) R.N. Parker, Ind. For. 57 (1931) 486. – *Aglaia ? polystachya* Wall. in Roxb., Fl. Ind. 2 (1824) 429. – *Sphaerosacme polystachia* Wall., List (1829) n. 1277, nom. nud. – *Amoora polystachya* (Wall.) Wight & Arn. ex Steud., Nomencl. ed. 2, 1 (1840) 78. – *Ricinocarpodendron polystachyum* (Wall.) Mabb., Malays. For. 45 (1982) 454. – Type: *de Silva in EIC 1277* (K-W, holo; G-DC, K), India, Assam, Silhet, '1821'.

*Andersonia rohituka* Roxb., Hort. Beng. (1814) 87, nom. nud. '*rohitoka*'; Fl. Ind. ed. Carey 2 (1832) 213. – *Amoora rohituka* (Roxb.) Wight & Arn. in Wight, Cat. (1833) 24. – *Aphanamixis rohituka* (Roxb.) Pierre, Fl. For. Cochinch. 5 (1895) sub t. 334, nom. nud.; ibid. (1897) t. 344B. – Type: *Roxburgh* (BM, P-LAM, with Roxburgh's script, '*Andersonia rohituka*'), India.

*Aphanamixis grandifolia* Bl., Bijdr. (1825) 165. – *Amoora aphanamixis* J.A. & J.H. Schultes, Syst. 7 (1830) 1621, nom. superfl. '*Amura*'. – *Amoora grandifolia* (Bl.) Walp., Repert. 1 (1842) 429. – *Aglaia aphanamixis* Pellegr., Fl. Gén. I.-C. 1 (1911) 767, nom. superfl. – Type: *Blume s.n.* (L, holo; M), Indonesia, Java, Mt Salak.

*Aphanamixis perrotetiana* A. Juss., Bull. Sci. Nat. Géol. 23 (1830) 239; Linnaea 6, Lit. (1831) 112, '*perrottetiana*'; Mém. Mus. Hist. Nat. Paris 19 (1832) 259, t. 14 f. 9a. – *Amoora perrotetiana* (A. Juss.) Steud., Nomencl. ed. 2, 1 (1840) 78. – Type: *Perrottet s.n.* (P, holo; FHO photo; G), Philippines, Mindanao, Zamboanga, Nov.–Dec. 1819.

*Aphanamixis timorensis* A. Juss., Bull. Sci. Nat. Géol. 23 (1830) 239; Mém. Mus. Nat. Hist. Paris 19 (1832) 259, t. 14 f. 9b. – *Amoora timorensis* (A. Juss.) Wight & Arn. ex Steud., Nomencl. ed. 2, 1 (1840) 78. – Type: *Anonymous s.n.* (P, holo; G, L), Indonesia, Timor.

[*Meliacea wightiana* Wall., List (1831/2) n. 4888, nom. nud.]

[*Sphaerosacme spicata* Wall., List (1831/2) n. 4895, nom. nud. – *Buchanania spicata* Roxb. ex Wall., l.c., nom. in syn.]

*Guarea amaris* Buch.-Ham., Mem. Wern. Soc. 6 (1832) 307; cf. Mabb., Taxon 26 (1977) 528. – Type: *Buchanan* (E, K-W), India, Goalpara, 8 Sept. 1808.

*Trichilia tripetala* Blanco, Fl. Filip. (1837) 354. – *A. tripetala* (Blanco) Merr., Sp. Blanc. (1918) 211. – Types: *Merrill Sp. Blanc. 988, 996* (PNH, lost, 'illustrative specimens'; L, isoneosyn), Philippines, Luzon, Ilocos Norte, Benguet, Nov. 1917.

*Amoora macrophylla* Nimmo in J. Grah., Cat. Pl. Bombay (1839) 31. – Type: *Nimmo* (? lost), India, Kandalla, ravine below old Toll House.

[*Aphanamixis cucullata* sensu auct. non Roxb.; Steud., Nomencl. ed. 2, 1 (1840) 78, 233, quoad syn. *Buchanania paniculata* Roxb.; cf. Mabb., Taxon 26 (1977) 528.]

[*Aphanamixis blumei* Span., Linnaea 15 (1841) 182, nom. in syn.]

[*Dysoxylum spiciflorum* Zipp. ex Span., Linnaea 15 (1841) 183, nom. nud.]

[*Piper hyalinum* Reinw. ex Miq., Ann. Mus. Bot. Lugd.-Bat. 4 (1868) 34, nom. in syn.]

*Amoora amboinensis* Miq., Ann. Mus. Bot. Lugd.-Bat. 4 (1868) 36. – *Aphanamixis amboinensis* (Miq.) Harms in E. & P., Nat. Pfl. Fam. 3, 4 (1896) 296, nom. nud. – Type: *Teijsmann & de Vriese* (Teijsmann, U; de Vriese, L), Indonesia, Moluccas, Ambon.

*Amoora aphanamixis* J.A. & J.H. Schultes var. *pubescens* Miq., Ann. Mus. Bot. Lugd.-Bat. 4 (1868) 34. – *Amoora grandifolia* (Bl.) Walp. var. *pubescens* (Miq.) C. DC. in DC., Mon. Phan. 1 (1878) 581. – Type: *Junghuhn 163* (L, lecto, excl. fol. = *Dysoxylum parasiticum* (Osb.) Kosterm.), Indonesia, Sumatra.

*Dysoxylum cuneatum* Hiern in Hook. f., Fl. Br. India 1 (1875) 549, p.p. – Type: *Maingay 1612 (Kew Distrib. 327)* (K, holo, quoad fruct.), Malaysia, 'Malacca', 1865.

*Cabralea richardiana* C. DC. in Mart., Fl. Bras. 11, 1 (1878) 176; cf. Pennington, Fl. Neotrop. 28 (1981) 242. – Type: (?) *Herb. Richard* (P?), Brazil or Cuba, introduced.

*Amoora cumingiana* C. DC. in DC., Mon. Phan. 1 (1878) 580. – *Aphanamixis cumingiana* (C. DC.) [Harms in E. & P., Nat. Pfl. Fam. 3, 4 (1896) 296, nom. nud.;] Merr., Enum. Philip. Fl. Pl. 2 (1923) 369. – *Ricinocarpodendron cumingianum* (C. DC.) Mabb., Malays. For. 45 (1982) 454. – Type: *Cuming 1894* (K, holo), Philippines.

*Amoora megalophylla* C. DC., Bull. Herb. Boiss. 2 (1894) 577. – Type: *Balansa 3705* (P, holo), Viet Nam, near Yen-Lang, Dec. 1887.

*Amoora megalophylla* C. DC. var. *frutescens* C. DC., Bull. Herb. Boiss. 2 (1894) 578. – *Aglaia aphanamixis* Pellegr. var. *frutescens* (C. DC.) Pellegr., Fl. Gén. I.-C. 1 (1911) 768. – Type: *Balansa 1486* (P, holo; K, L), Viet Nam, Dong Dang, Feb. 1886.

*Amoora myrmecophila* Warb., Bot. Jahrb. 18 (1894) 194. – *Aphanamixis myrmecophila* (Warb.) Harms in E. & P., Nat. Pfl. Fam. 3, 4 (1896) 296, nom. nud.; in K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee (1900) 383. – Type: *Hellwig 488* (B, lost, holo), Papua New Guinea, Morobe Dist., Finschhafen, Butaueng, 23 March 1889.

*Aphanamixis cochinchinensis* Pierre, Fl. For. Cochinch. 5 (1897) t. 343B. – *Aglaia cochinchinensis* (Pierre) Pellegr., Fl. Gén. I.-C. 1 (1911) 769, non Pierre (1897 = *Aglaia* aff. *silvestris* (M.J. Roem.) Merr.). – Type: *Pierre 1794* (P, holo; K, L), Viet Nam, Bien Hoa, near Baochang, July 1877.

*Aphanamixis lauterbachii* Harms in K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee (1900) 383. – *Amoora lauterbachii* (Harms) C. DC., Bull. Herb. Boiss. II, 3 (1903) 170. – Type: *Lauterbach 2643* (B, lost, holo), Papua New Guinea, Madang Dist., Ramu R., 50 m, 13 Aug. 1896.

*Aphanamixis macrocalyx* Harms in K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee (1900) 384. – *Amoora macrocalyx* (Harms) C. DC., Bull. Herb. Boiss. II, 3 (1903) 170. – Types: *Lauterbach 2380* (B, lost), Papua New Guinea, Madang Dist., Ssigaun, 17 June 1896; *Lauterbach 2457* (B, lost), Schumann R., Lager 2, 300 m, 3 July 1896; *Rodatz & Klink 110, 112, 226* (all B, lost), Bismarck Mts, 29 June–7 July 1899.

*Amoora elmeri* Merr., Philip. Govt Lab. Bur. Bull. 29 (1905) 23. – *Aphanamixis elmeri* (Merr.) Merr., Philip. J. Sc. 11 (1916) Bot. 15, '*Aphanamyxis*'. – Type: *Elmer 6306* (PNH, lost, holo; G, K, P), Philippines, Luzon, Benguet, Magulo, 17 May 1904.

*Amoora polillensis* Robins., Philip. J. Sc. 6 (1911) Bot. 206. – *Aphanamixis polillensis* (Robins.) Merr., Enum. Philip. Fl. Pl. 2 (1925) 370. – Type: *Robinson BS 6939* (PNH, lost, holo), Philippines, Polillo, east of town.

*Aphanamixis coriacea* Merr., Philip. J. Sc. 11 (1916) Bot. 14, '*Aphanamyxis*'. – Type: *Ramos BS 23576* (PNH, lost, holo; K), Philippines, Luzon, Sorsogon, Mt Pozdal, 10 Sept. 1915.

*Amoora sogerensis* Bak. f., J. Bot. Lond. 61 Suppl. (1923) 8. – Type: *Forbes 418* (BM, holo), Papua New Guinea, Central Dist., Sogeri Region, 1883-6.

*Aphanamixis pinatubensis* Elmer, Leafl. Philip. Bot. 9 (1934) 3205. – Type: *Elmer 22179* (PNH, ? lost, holo; G, K, L, P), Philippines, Luzon, Pampanga Prov., Zambales Mts, Mt Pinatubo, Camp Stotsenburg, May 1927.

[*Aphanamixis velutina* Elmer, Leafl. Philip. Bot. 9 (1937) 3338, nom. non rite publ. (anglice).]

[*Aphanamixis agusanensis* Elmer, l.c. (1937) 3328, nom. non rite publ. (anglice).]

[*Aphanamixis apoensis* Elmer, l.c. (1937) 3326, nom. non rite publ. (anglice).]

[*Aphanamixis davaoensis* Elmer, l.c. (1937) 3331, nom. non rite publ. (anglice).]

[*Aphanamixis obliquifolia* Elmer, l.c. (1937) 3333, nom. non rite publ. (anglice).]

[*Chuniodendron spicatum* Hu, J. Roy. Hort. Soc. 63 (1938) 387, t. 104, nom. non rite publ. (ic. solum).]

[*Chuniodendron yunnanenses* Hu, l.c. 387, t. 105, nom. non rite publ. (ic. solum).]

*Aphanamixis schlechteri* Harms in E. & P., Nat. Pfl. Fam. ed. 2, 19bI (1940) 127, 176, nom. nud.; Bot. Jahrb. 72 (1942) 160, e descr. – Types: *Schlechter 17068* (B, lost, syn), Papua New Guinea, Boroai, 500 m, 27 Dec. 1907; *Schlechter 18962* (B, lost, syn), Toliba, 300 m, 14 Dec. 1908.

*Aglaia janowskyi* Harms, Bot. Jahrb. 72 (1942) 176. – *Amoora janowskyi* (Harms) Kosterm., Reinwardtia 7 (1966) 265. – Type: *Janowsky 415* (B, lost, holo; BO), Indonesia, Irian Jaya, Jabi Mts, 8 June 1913.

*Aphanamixis sinensis* How & Chen, Acta Phytotax. Sin. 4 (1955) 29, t. 3. – Type: *Wang 36511* (IBSC, holo, n.v.), China, Hainan, Ling-Shui Hsien, 1 Jan. 1934.

*Amoora beddomei* Kosterm., Acta Bot. Neerl. 31 (1982) 133. – Type: *Beddome s.n.* (L, holo, not found; K?), India, Anamalays.

[*Lansium montanum* Rumpf, Herb. Amb. 1 (1741) 154, t. 56; cf. Mabb., Taxon 26 (1977) 527.]

## 2. Aphanamixis borneensis (Miq.) Merr.

*Aphanamixis borneensis* (Miq.) [Harms in E. & P., Nat. Pfl. Fam. 3, 4 (1896) 296, nom. nud.;] Merr., J. Roy. As. Soc. Str. Br. spec. no. (1921) 321. – *Amoora borneensis* Miq., Ann. Mus. Bot. Lugd.-Bat. 4 (1868) 36. – *Ricinocarpodendron borneense* (Miq.) Mabb., Malays. For. 45 (1982) 454. – Type: *Korthals s.n.*, Indonesia, Borneo, Mt Prarawin (there are no sheets at L or U inscribed Mt Prarawin, just several labelled 'Borneo', which belong here and are annotated by Miquel.

[*Aphanamixis sumatrana* sensu auct. non Ridley; Merr., J. Roy. As. Soc. Str. Br. 86 (1922) 317; Univ. Calif. Publ. Bot. 15 (1929) 123.]

*Aphanamixis pedicellata* Ridley, Bull. Misc. Inf. Kew (1930) 370. – Type: *Haviland 2132* (K, holo; L), Malaysia, Sarawak, near Kuching, 28 Jan. 1893.
[*Aphanamixis pulgarensis* Elmer, Leafl. Philip. Bot. 9 (1937) 3336, nom. non rite publ. (anglice).]
*Walsura punctata* Süssenguth var. *papillosa* Süssenguth & Heine, Mitt. Bot. Staatssamml. Münch. 2 (1950) 59. – Type: *Clemens 28649 = 28668* (M, holo; K, L), Malaysia, Sabah, Mt Kinabalu, Tenompok, 1500 m, 4 March 1932.

## 3. Aphanamixis sumatrana (Miq.) Ridley

*Aphanamixis sumatrana* (Miq.) Ridley, Fl. Mal. Pen. 1 (1922) 400. – *Amoora sumatrana* Miq., Ann. Mus. Bot. Lugd.-Bat. 4 (1868) 35. – *Aphanamixis sumatrana* Harms in E. & P., Nat. Pfl. Fam. 3, 4 (1896) 296, nom. nud. – *Ricinocarpodendron sumatranum* (Miq.) Mabb., Malays. For. 45 (1982) 454. – Type: *Korthals s.n.* (L, lecto), Indonesia, Sumatra, 'prope Padang'.

I have seen no gathering by Korthals at L or U, labelled 'prope Padang'. King (J. As. Soc. Beng. 64, ii, 1895, 52) effectively lectotypified Miquel's plant by referring to the material at L with three anthers. Miquel did not mention anther number and besides the material quoted by King had labelled a Korthals specimen with 6 anthers *Amoora sumatrana* as well. It represents *Aphanamixis polystachya.* King's lectotype bears a label in Korthals's hand, '*Amora* (sic) *grandifolia* Sumatra Korthals'.

### *Species to be excluded from Aphanamixis*

*Aphanamixis decandra* (Wall.) Kosterm., Reinwardtia 7 (1966) 262 = **Sphaerosacme decandra** (Wall.) Pennington.
*Aphanamixis humilis* (Hassk.) Kosterm., l.c. 263 = **Reinwardtiodendron humile** (Hassk.) Mabb.
*Aphanamixis reticulosa* Kosterm., Reinwardtia 7 (1965) 30 = **Aglaia oligophylla** Miq.
*Aphanamixis rubiginosa* Griff. ex C.DC. in DC., Mon. Phan. 1 (1878) 585, nom. in syn. = **Aglaia rubiginosa** (Hiern) Pannell.
*Aphanamixis trichanthera* Koord., Exk. Fl. Java 2 (1912) 444 = **Aglaia** sp. (cf. *rubescens* (Hiern) Pannell).

## 3. LANSIUM AND REINWARDTIODENDRON (AGLAIEAE)

Following the work of Pellegrin (who later recanted), Kostermans (1966) placed both *Lansium* Correa and *Reinwardtiodendron* Koord. in *Aglaia* Lour., their constituent species making up the bulk of his sect. *Lansium* (Correa) Kostermans. Pennington & Styles (1975) segregated these genera once more, a line previously adhered to by Harms (1940), who, however, had included both *Sphaerosacme* Wall. ex Royle and some species of *Reinwardtiodendron*, admittedly as separate sections from typical *Lansium*, in that last genus. Pennington & Styles (1975) in their treatment of *Lansium* (p. 485) dismantled sect. *Lansium* (Correa) Kostermans by assigning *Aglaia steenisii, A. aquea, A. dookoo, A. domestica* and *A. sepalina* to *Lansium* and *A. rein-*

*wardtiana, A. pseudolansium, A. kinabaluensis, A. dubia* and *A. anamallayana* to *Reinwardtiodendron.* In the absence of available flowering material, they hesitated to assign the remaining five species in Kostermans's section. Materials at Leiden show that *Aglaia breviracemosa* is to be returned to *Lansium, A. kostermansii* belongs to *Reinwardtiodendron*, while flowering material of *A. membranacea* assigned to *A. sepalina* by Kostermans shows that *A. membranacea* too belongs in *Lansium. A. intricatoreticulata* Kostermans is based on scrappy fruiting material from the Malay Peninsula and recognized by the collectors as *Lansium domesticum.* The fruits match that species in the broad sense although the leaflets of the type are more exactly opposite than in most specimens. I have included it with some hesitation in that species. Some of my hesitation derives from the similarity of the venation of the leaflets of the type (*Burkill SFN 6400a*) and those of *Lepisanthes* species (Sapindaceae), a view with which Dr. P.W. Leenhouts (in sched.) concurs. Furthermore, he notes that the fruits are not actually attached to the infructescence axis. The paratype specimens more closely resemble *Lansium domesticum* (*Alvins s.n., 2219* and *FD 16538*, all SING). Certainly attributable to *Lepisanthes tetraphylla* (Vahl) Radlk., however, are the type (*van Steenis 6455*, BO) and paratypes (*Korthals s.n.*, L) of *Aglaia chartacea* Kosterm., the last species in the section. Excluding this last species and including an apparently new species of *Reinwardtiodendron*, too inadequately known to be formally described, the species referable to *Lansium* and *Reinwardtiodendron* are as set out below.

## LANSIUM

*Lansium* Correa, Ann. Mus. Hist. Nat. Paris 10 (1807) 157; Harms in E. & P., Nat. Pfl. Fam., ed. 2, 19bI (1940) 123, p.p. (sect. '*Eulansium*'); Pennington, Blumea 22 (1975) 483. – *Aglaia* Lour. sect. *Lansium* (Correa) Kosterm., Reinwardtia 7 (1966) 221, p.p. – Type: *Lansium domesticum* Correa.

[*Plutea* Nor., Verh. Batav. Genoot. 5, ed. 1 art. 4 (1791) 3, nom. nud.]

Trees with pinnate leaves. Indumentum of simple hairs. Flowers unisexual (trees dioecious) and hermaphrodite in spikes, racemes or basally-branched panicles borne on twigs, branches or bole. Calyx deeply 5-lobed, the lobes imbricate. Petals 5, united with staminal tube at base. Staminal tube more-or-less globose with more-or-less undulate margin. Anthers (8) 10 in one whorl inside throat of tube, glabrous. Disk absent. Ovary 3–5-locular. Style long and broad-columnar, its flanks ribbed with the impressions of the surrounding anthers. Fruit a 1–5-seeded berry; seed usually arillate.

Distribution. Three species from Peninsular Thailand to Lesser Sunda Islands (*L. domesticum* widely planted but status uncertain in Moluccas and West New Guinea).

N.B. I have excluded from the synonymy *Lachanodendron* Reinw. ex Blume, Cat. Gew. Buitenzorg (1823) 70. Although this is a *nomen nudum*, it has appeared in all standard works as a synonym of *Lansium.* In Blume's work, the only connexion with *Lansium* is that *Lachanodendron* appears as the genus (alphabetically arranged) before *Lansium.* In Nees's account of Blume's work, printed in Flora 8 (1825) 103, there is *Lachnodendron domesticum*, which has been attributed to 'Reinw. ex Nees'.

As neither *Lachanodendron album*, nor *Lansium domesticum* of Blume appears in Nees's account, it would appear that the new name is a lapsus, being a running together of the two Blume names. I have not seen any Meliaceous specimen at Leiden, where many Reinwardt MS names are found on specimens from his collections, bearing the name *Lachanodendron*, such that the name is at best to be included in the family with doubt, though more likely it is best excluded altogether.

## KEY TO THE SPECIES OF LANSIUM

1a. Calyx lobes triangular, reflexed at anthesis; calyx tube continuous with pseudopedicel 4–6 mm long, articulated with pedicel to 1.5 mm (Sumatra) **1. L. membranaceum**
b. Calyx lobes orbicular to suborbicular, not reflexed at anthesis; calyx tube sessile or subsessile . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2
2a. Fruit ellipsoid to globose, 2–4 cm long; infructescences on branches and bole, more rarely on twigs (widespread and cultivated) . . . . . . . . **2. L. domesticum**
b. Fruit globose, to 15 mm diam.; infructescences borne on twigs (Sumbawa and Flores) . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **3. L. breviracemosum**

### 1. Lansium membranaceum (Kosterm.) Mabb., *comb. nov.*

*Aglaia membranacea* Kosterm., Reinwardtia 7 (1966) 260. – Type: *Meijer 4922* (L, holo), Indonesia, Sumatra, Pajakumbuh, Mt Sago near Haleban, 800 m, April.

Distribution. Known from only three collections from Mt Sago.

### 2. Lansium domesticum Correa *agg.*

*L. domesticum* Correa, Ann. Mus. Hist. Nat. Paris 10 (1807) 157, t. 10 f. 1. – *L. domesticum* var. *typicum* Backer, Fl. Batav. 1 (1907) 279 ('*typica*'), nom. superfl. – *Lachanodendron domesticum* Nees, Flora 8 (1825) 103, nom. nud., laps. pro *Lansium domesticum*. – *Aglaia domestica* (Correa) Pellegr., Fl. Gén. I.-C. 1 (1911) 766, nom. illeg. (*Baccaurea sylvestris* Lour. in syn.); Kosterm., Reinwardtia 7 (1966) 244, q.v. for further literature citations. – Type: *Kostermans s.n.* (BO, neo, designated ('Lectotypus propositum') by Kostermans, l.c.).

*L. domesticum* Correa var. *aqueum* Jack, Trans. Linn. Soc. 14 (1823) 116. – *L. aqueum* (Jack) M.J. Roemer, Syn. Hesp. 1 (1846) 99. – *Aglaia aquea* (Jack) Kosterm., Reinwardtia 7 (1966) 234, t. 4, q.v. for further literature citations. – *L. parasiticum* Sahni & Bennet var. *aqueum* (Jack) Sahni & Bennet, Ind. For. 100 (1974) 202 ('*paraciticum* var. *aequem*'). – Type: *Kostermans s.n.* (BO, neo, designated ('Lectotypus propos.') by Kostermans, l.c.; K, L), Indonesia, Java, Bogor, cult., Nov. 1959.

*L. javanicum* M.J. Roemer, Syn. Hesp. 1 (1846) 99. – Type: *L. domesticum* sensu Blume, Bijdr. (1825) 165. A *Blume* sheet at L is *L. domesticum*.

*Aglaia dookoo* Griff., Notulae 4 (1854) 505 e descr.; Kosterm., Reinwardtia 7 (1966) 238, tt. 5 a, b, q.v. for further literature citations. – Type: Malaysia, 'Malacca ad Malim'. No material found in *Griffith*'s collections at K.

*L. domesticum* Correa var. *pubescens* Koord. & Val., Bijdr. Booms. Java 3 (1896) 181. – Type: *Koorders 5127β* (BO, holo; L), Indonesia, Java.

*L. javanicum* Koord. & Val. ex Moll. & Janss., Mikrogr. Holzes 2 (1911) 176, non M.J. Roemer (1846). – Type: *Koorders 23439β* (BO, holo; L), Indonesia, Java, Pasuruan, Tangkil.

*Amoora racemosa* Ridley, J. Fed. Mal. St. Mus. 10 (1920) 88. – Type: *Kloss 7039* (K!, holo), Peninsular Thailand, Phuket, Tasan.

*Taeniochlaena polyneura* Schellenb., Bot. Jahrb. 59, Beibl. 131 (1924) 24; cf. Leenh., Fl. Males. I, 5 (1958) 510. – Type: *Motley 685*, larger twig (K, lecto) effectively selected by Leenh., l.c., Indonesia, SE. Borneo, Banjermasin, 1857-8.

[*Aglaia merrillii* Elmer, Leafl. Philip. Bot. 9 (1937) 3298, nom. non rite publ. (anglice).]

*L. pedicellatum* Kosterm., Reinwardtia 7 (1965) t. 11, non Hiern [1875 = *Aglaia littoralis* Miq. (*Aglaia maingayi* Hiern)]. – *Aglaia steenisii* Kosterm., Reinwardtia 7 (1966) 232, t. 2, excl. spec. Meijer (= *L. membranaceum*). – Type: *van Steenis 3444* (BO, holo; L, U), Indonesia, Sumatra, Palembang, G. Pakurang, north slope, NW of Lake Ranau.

*L. sepalinum* Kosterm., Reinwardtia 7 (1965) 31, t. 12. – *Aglaia sepalina* (Kosterm.) Kosterm., op. cit. (1966) 258, t. 11. – Type: *Jacobs 4456* (BO, holo; K, L), Indonesia, Sumatra, west side of Mt Tudjuh complex.

?*Aglaia intricatoreticulata* Kosterm., Reinwardtia 7 (1966) 259, t. 12. – Type: *Burkill SFN 6400a* (SING, holo), Malaysia, Negri Sembilan, Gemas.

*L. parasiticum* Sahni & Bennet, Ind. For. 100 (1974) 202, excl. basion. (*Melia parasitica* Osb. = *Dysoxylum parasiticum* (Osb.) Kosterm.).

[*Lance* Bont., Hist. Nat. Med. Ind. Or. 6 (1658) 109.]

[*Boboa seu Lanzones* Kamel, App. Herb. Luz. Philip. (1704) 56.]

[*Lansium* Rumpf, Herb. Amb. 1 (1741) 151, t. 54.]

Distribution. Peninsular Thailand and Malesia, wild, cultivated and naturalized in Malay Peninsula, Sumatra, Java, Borneo, Philippines (? native), Sulawesi (? native), Moluccas (? native), West New Guinea (? native).

*Lansium domesticum* is one of the important native fruit trees of Malesia and is widely planted. A number of selected forms are known by their vernacular names, though the usage of these names is not consistent throughout the archipelago (see my Flora Malesiana account for fuller details). Prakash et al. (1977) have shown that the forms known as *duku* and *langsat* in the Malay Peninsula are apomictic. Bernado et al. (1961) have shown that the Philippine cultivated trees known as *lanzones*, which resemble the Malayan plants, are also apomictic and parthenocarpic. Wild trees in the Malay Peninsula have smaller, sourer fruits with latex in the pericarp. According to Dr. F.S.P. Ng, they are not readily grown outside the forest. Selected trees persist in secondary vegetation long after cultivation is abandoned and it is difficult to pigeon-hole herbarium material of these and other selected forms such as the *duku-langsat* of the Malay Peninsula, a form with features of the two other commonly cultivated ones. Furthermore, forms with very large leaflets have been collected in northern Sumatra and southern Thailand, but whether these are truly wild plants or no is not clear. In Kostermans's account (1966), there is a valiant attempt to classify all the cultivated trees and their wild allies. The major clones in Java (*kokossan, bidjitan, duku*) are accorded specific rank (*Aglaia aquea*, *A. domestica*, nom. illeg., and *A. dookoo*, a name probably based on the *duku* of the Malay Peninsula, not of Java, a different plant), while closely similar wild trees have been either included with them or assigned to separate species (*Aglaia steenisii, A. sepalina, ?A. intricatoreticulata*).

In view of the apomictic nature of many of these trees and the confusion engendered by trying to equate the vernacular names of the different islands as well as the

absence of a long-term series of field experiments and embryological investigations of truly wild specimens, it seems to me best, for the time being at least, to revert to a single binomial as most recent authors have indeed already done. Within this aggregate species, a number of cultivar names for the well known fruit trees may be profitably used, rather than a number of microspecies circumscribed on inadequate evidence. According to the 'International Code of Nomenclature for Cultivated Plants', 1980, Art. 11, one of the criteria for categorizing a cultivar is a group of plants 'consisting of a clone or several closely similar clones .... derived originally .... for example .... by .... obligate apomixis.' Possibly the earliest names which could be interpreted as cultivars rather than botanical varieties are those of Hasskarl, Cat. Pl. Bog. (1844) 220: 'Kokossan', 'Bidjietan', 'Duku'.

3. **Lansium breviracemosum** Kosterm.

*L. breviracemosum* Kosterm., Bull. Bot. Surv. India 7 (1965) 128. – *Aglaia breviracemosa* (Kosterm.) Kosterm., Reinwardtia 7 (1966) 233. – Type: *Kostermans 18311* (BO, holo; K, L), Indonesia, Lesser Sunda Islands, Sumbawa, Mt Batulante, trail from Batudulang to Pukis, 700–800 m, April.

Distribution. Known from only ten collections from the rain forest of Sumbawa (400–1000 m) and Flores (1000–1360 m), Lesser Sunda Islands.

*Species to be excluded from Lansium*

See Kostermans (1966) for detailed citations.

*Aglaia chartacea* Kosterm. = **Lepisanthes tetraphylla** (Vahl) Radlk. (Sapindaceae) (see above).

*Lachanodendron album* Reinw. ex Blume, nom. nud. = ? (see above).

*Lansium decandrum* (Wall.) Briq. = **Sphaerosacme decandra** (Wall.) Penn. (*Aphanamixis decandra* (Wall.) Kosterm.).

*Lansium monophyllum* Merr. ex Perkins, nom. in syn. = **Reinwardtiodendron celebicum** Koord.

*Lansium montanum* Jack ex Spreng., Syst. 3 (1826) 66. – *Milnea montana* [Jack, Trans. Linn. Soc. 14 (1823) 118, nom. provis.] (Spreng.) Steud., Nomencl. ed. 2, 1 (1841) 142; Miq., Fl. Ind. Bat. 1, 2 (1859) 544. – *Selbya montana* (Spreng.) M.J. Roemer, Syn. Hesp. 1 (1846) 126. – Except for the two styles mentioned by Jack, this tree, with its imparipinnate leaves (3 leaflets on each side), small greenish flowers, each with a tube and five stamens, borne in short inflorescences, and *lanseh*-like berries with bitter flesh, fits **Aglaia**. Wight & Arnott (Prod., 1834, 118) referred it to *Aglaia odorata* Lour., but its heavy petiolar indumentum would seem to suggest another, native Sumatran, species, an opinion held by Dr. Pannell (in litt.), who is monographing the genus.

*Lansium pedicellatum* Hiern. – *Aglaia pedicellata* (Hiern) Kosterm. = **Aglaia littoralis** Miq. (*Aglaia maingayi* Hiern).

*Lansium silvestre* M. J. Roem. = **Aglaia silvestris** (M. J. Roem.) Merr. (*?Aglaia ganggo* Miq.).

## REINWARDTIODENDRON

*Reinwardtiodendron* Koord., Meded. Lands Plant. Buitenzorg 19 (1898) 389; Suppl. Fl. N. O. Celebes 1 (1919) 23, t. 8a, b; Harms in E. & P., Nat. Pfl. Fam. ed. 2, 19bI (1940) 125; Pennington, Blumea 22 (1975) 486; Mabb., Malays. For. 45 (1982) 451. – Type: *Reinwardtiodendron celebicum* Koord.

*Lansium* Correa sect. *Neolansium* Harms in E. & P., Nat. Pfl. Fam. ed. 2, 19bI (1940) 124. – Type (selected here): *Lansium humile* Hassk. (=*Reinwardtiodendron humile* (Hassk.) Mabb.

*Aglaia* Lour. sect. *Lansium* (Correa) Kosterm., Reinwardtia 7 (1966) 221, p.p., excl. typ.

Trees with unifoliolate to pinnate leaves. Indumentum of simple hairs. Flowers hermaphrodite, in axillary spikes or basally branched panicles. Calyx deeply 3–5-lobed. Petals 5, united with staminal tube at base. Staminal tube more-or-less globose with undulate or lobed margin; anthers 10, in 2 whorls of 5, glabrous. Disk absent. Ovary (3- or) 5-locular. Style short, stylehead obscurely lobed. Fruit a 1- (or 2-)seeded berry; seed apparently sarcotestal.

Distribution. Seven species distributed from India to New Guinea.

### KEY TO THE SPECIES OF REINWARDTIODENDRON*

1a. Leaves unifoliolate . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 6. R. celebicum
b. Leaves pinnate . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2
2a. Secondary veins almost as prominent as primary, at least on adaxial surface 5. R. humile
b. Secondary veins not so prominent . . . . . . . . . . . . . . . . . . . . . . . . . . 3
3a. Adaxial surface of leaflet midrib brown tomentose . . . . . . . . . 1. R. cinereum
b. Adaxial surface of leaves glabrous . . . . . . . . . . . . . . . . . . . . . . . . . . 4
4a. Peduncles glabrous; domatia unrecorded . . . . . . . . . . . . . . 4. R. kostermansii
b. Peduncles pilose; domatia frequently present . . . . . . . . . . . . . . . . . . . . 5
5a. Leaflet base cuneate to attenuate . . . . . . . . . . . . . . . . . . 2. R. anaimalaiense
b. Leaflet base obtuse . . . . . . . . . . . . . . . . . . . . . . . . . 3. R. kinabaluense

### 1. Reinwardtiodendron cinereum (Hiern) Mabb.

*R. cinereum* (Hiern) Mabb., Malays. For. 45 (1982) 452. – *Lansium cinereum* Hiern in Hook. f., Fl. Br. India 1 (1875) 558. – *Aglaia pseudolansium* Kosterm., Reinwardtia 7 (1966) 252, t. 6. – Type: *Maingay 1908 (Kew Distrib. 339)* (K), Malaysia, 'Malacca'.

Distribution. Sumatra, Malay Peninsula, Borneo.

### 2. Reinwardtiodendron anaimalaiense (Bedd.) Mabb.

*R. anaimalaiense* (Bedd.) Mabb., Malays. For. 45 (1982) 452. – *Lansium anaimalaiense* Bedd., Madras J. Sci. III, 1 (1864) 40, t. 4; Trans. Linn. Soc. 25 (1865) 212, '*anamalayanum*'; Fl. Sylv. (1871) t. 131, '*anamallayanum*'; Icon. Pl. Ind. Or. (1874) t. 104, '*anamallayanum*';

* The undescribed species from Sumatra is not included.

Hiern in Hook. f., Fl. Br. India 1 (1875) 558, '*anamalayanum*'; C. DC. in DC., Mon. Phan. 1 (1878) 597, t. 7, f. 11, '*anamalayanum*'; Talbot, Trees Bombay (1894) 40, '*anamalayanum*'; op. cit. ed. 2 (1902) 112, '*anamallayanum*'; For. Fl. Bombay 1 (1909) 237, t. 140, '*anamallayanum*'; Cooke, Fl. Bombay 1 (1903) 210, '*anamallayanum*'; Brandis, Ind. Trees (1906) 144, '*anamalayanum*'; Gamble, Fl. Madras 1 (1915) 182, '*anamallayanum*'; Wealth of India 6 (1962) 29, '*anamallayanum*'. – *Aglaia anamallayana* (Bedd.) Kosterm., Reinwardtia 7 (1966) 257, t. 10. – *R. anamallayanum* (Bedd.) Saldanha in Saldanha & Nicolson, Fl. Hassan Dist. (1976) 392, nom. provis. – Type: *Beddome s.n. '1143-1146'* (BM, K, ?L), India, Travancore, Anamallays.

Distribution. South India (western Ghats).

### 3. Reinwardtiodendron kinabaluense (Kosterm.) Mabb., *comb. nov.*

*Aglaia kinabaluensis* Kosterm., Reinwardtia 7 (1966) 252, t. 6. – Type: *Chew, Corner & Stainton 122* (BO, holo; K, L, SING), Malaysia, Sabah, Mt Kinabalu.

Distribution. Northern Borneo.

### 4. Reinwardtiodendron kostermansii (Prijanto) Mabb., *comb. nov.*

*Lansium kostermansii* Prijanto, Reinwardtia 7 (1965) 63, t. 1a, b. – *Aglaia kostermansii* (Prijanto) Kosterm., Reinwardtia 7 (1966) 256, t. 9. – Type: *Kostermans 19117* (BO, holo; K, L, SING), Indonesia, Sumbawa, 500 m, rivergorge near Sg. Lit, near Batudulang.

Distribution. West Sumbawa and West Flores.

### 5. Reinwardtiodendron humile (Hassk.) Mabb.

*R. humile* (Hassk.) Mabb., Malays. For. 45 (1982) 452. – *Lansium humile* Hassk., Hort. Bog. ed. nov. 1 (1858) 121. – *Aphanamixis humilis* (Hassk.) Kosterm., Reinwardtia 7 (1966) 263, '*humile*'. – Type (selected by Mabb., l.c.): Indonesia, Java, Bogor, cult. (ex Sumatra) 'III-B-47' '417' (K, lecto).

*Lansium dubium* Merr., Bull. Dept. Int. Bur. Govt Lab. Philip. 17 (1904) 23. – *Aglaia dubia* (Merr.) Kosterm., Reinwardtia 7 (1966) 254. – Type: *Merrill 3081* (PNH, lost, holo; BM, K), Philippines, Masbate, Aug. 1903.

[*Lansium sp.* Merr., Lingn. Sc. J. 5 (1927) 104.]

Distribution. Hainan, Indochina, Malay Peninsula, Sumatra, Java, Borneo, Philippines and SE. Sulawesi.

### 6. Reinwardtiodendron celebicum Koord.

*R. celebicum* Koord., Meded. Lands Plant. Buitenzorg 19 (1898) 389. – *Aglaia reinwardtiana* Kosterm., Reinwardtia 7 (1966) 230, t. 1. – Type: *Koorders 19713β* (BO, holo; K, L, P), Indonesia, Sulawesi, Minahasa, Pingsan.

*R. merrillii* Perkins, Fragm. Fl. Philip. (1904) 74. – Type: *Merrill 3149* (B, lost, lecto (Kostermans, l.c.); BM, K), Philippines, Luzon, Bataan, Lamao R., Mt Mariveles, Oct. 1903.

[*Lansium monophyllum* Merr. ex Perkins, Fragm. Fl. Philip. (1904) 75, nom. in syn.]

Distribution. E. Borneo, Philippines, Sulawesi, Moluccas, W. New Guinea.

7. *Species non satis cognita*

A single fruiting collection from northern Sumatra, Atjeh, Sikundur Forest Reserve, c. 75 km WNW of Medan, c. 3°55'N 98°05'E, Besitang River, 50 m, 4 Aug. 1979, *de Wilde & de Wilde-Duyfjes 19331* (L), is not referable to any of the above but seems closest to *Reinwardtiodendron kostermansii*, from which it differs in its conspicuously ribbed velutinous fruit.

## 4. SANDORICUM (SANDORICEAE)

### SANDORICUM

*Sandoricum* Cav., Diss. 7 (1789) 359; Harms in E. & P., Nat. Pfl. Fam. ed. 2, 19bI (1940) 170; Pennington, Blumea 22 (1975) 507. – Type: *Sandoricum indicum* Cav. (= *S. koetjape* (Burm. f.) Merr.).

Trees. Indumentum of simple hairs. Leaves trifoliolate. Flowers in axillary thyrses. Calyx ± truncate to shallowly 4- or 5-lobed. Petals (4) 5, free, imbricate. Staminal tube cylindrical, ribbed distally, margin with 5 or 10 short lobes; anthers 10, glabrous, included. Disk tubular, free, margin coarsely toothed. Ovary somewhat sunk in receptacle, 4- or 5-locular, locules each with 2 collateral ovules; stylehead with 4- or 5-lobed stigma. Fruit a 1–5-locular drupe; pyrenes 1- (or 2-)seeded; outer mesocarp rather dry-fleshy or soft and fibrous, inner mesocarp fleshy or spongy-fibrous; endocarp thin, cartilaginous. Seeds kidney-shaped, laterally compressed, with thin sarcotesta; endosperm 0; cotyledons thick, plano-convex, collateral; radicle apical, extending to surface or slightly exserted.

Distribution. Five species, all but one, *S. koetjape*, restricted to western Malesia, where the cultivated forms of *S. koetjape* (q.v.) may have arisen, though wild relations appear to be native as far east as New Guinea. All five are native in Borneo, to which island three are restricted.

### KEY TO THE SPECIES OF SANDORICUM

1a. Leaflets obovate (to elliptic), apices rounded or emarginate; peatswamp forests **5. S. beccarianum**

b. Leaflets lanceolate, ovate (or elliptic), apex ± acuminate; other habitats .... 2

2a. Leaflets glabrous, lanceolate (or elliptic), bases obtuse to rounded (Borneo); riverbanks .............................. **3. S. borneense**

b. Leaflets pubescent to subglabrous (or glabrous), ovate; bases cuneate to rounded .............................................. 3

3a. Leaflets long-acuminate (acumen to 24 mm), bases cuneate (Borneo) **4. S. caudatum**

b. Leaflets acute to acuminate (acumen never more than 15 mm), bases rounded, obtuse to acute (or subcuneate) ............................ 4

4a. Calyx 4–4.5 mm long, dark brown; petals glabrous; staminal tube with 5 erose lobes; petiolule of apical leaflet 4–10 cm (Borneo) . . . . . . . . **1. S. dasyneuron**
b. Calyx c. 3.5 mm, yellow-green; petals ± pubescent; staminal tube with 10 bifid lobes; petiolule of apical leaflet 3–4.5 cm . . . . . . . . . . . . . . . . **2. S. koetjape**

## 1. Sandoricum dasyneuron Baill.

*S. dasyneuron* Baill., Adansonia 11 (1874) 265. – Type: *Beccari 299* (G-DC, M, P), Malaysia, Sarawak.

Distribution. Borneo.

## 2. Sandoricum koetjape (Burm. f.) Merr.

*S. koetjape* (Burm. f.) Merr., Philip. J. Sc. 7 (1912) Bot. 237. – *Melia koetjape* Burm. f., Fl. Ind. (1768) 101. – *Trichilia nervosa* Vahl, Symb. 1 (1790) 31, nom. superfl. – *S. nervosum* (Vahl) M.J. Roemer, Syn. Hesp. 1 (1846) 108, non Bl. (1825). – Type: *Anonymous in Hb. Burman s.n.* (G, holo), Indonesia, Java.

*S. indicum* Cav., Diss. (1789) 359, tt. 202, 203. – Type: *Poivre s.n.* (P-JU), ?Philippines.

[*Azedarach edulis* Nor., Verh. Batav. Genoot. 5, ed. 1 (1791) art. 4, 5, nom. nud.]

*S. nervosum* Bl., Bijdr. (1825) 163. – Type: *Blume s.n.* (L, holo; K), Indonesia, Java, 1823-4.

*Trichilia venosa* Spreng., Syst. 3 (1826) 68. – *S. venosum* (Spreng.) M.J. Roemer, Syn. Hesp. 1 (1846) 109. – Type: *Anonymous (?Sieber) s.n.* (MEL, holo; photo at FHO; (?) duplicates from same tree cultivated at the Mauritius botanic garden at G-DC, K, M), Mauritius, cult.

?*S. serratum* G. Don f., Gen. Syst. 1 (1831) 680. – Type: probably a cult. plant (not at BM, possibly not preserved).

*S. ternatum* Blanco, Fl. Filip. (1837) 346. – Type: *Merrill Sp. Blanc. 7* (PNH, lost, neo, 'representative specimen' of Merr., Spec. Blanc. (1918) 209; K, L), Philippines, Luzon, Pangasinan Prov., May 1914.

*S. glaberrimum* Hassk., Retzia 1 (1855) 145. – Type: Indonesia, Java, Bogor, cult. (?BO, holo; specimen at L labelled 'misit Hassk.').

[*S. indicum* var. *velutinum* Hiern in Hook. f., Fl. Br. India 1 (1875) 553, nom. nud.]

*S. maingayi* Hiern, op. cit. 554. – Type: *Maingay 2967 (Kew Distrib. 328)* (K, holo), Malaysia, Malacca, 13 Feb. 1868.

*S. maingayi* var. *quadripetalum* C.DC. in DC., Mon. Phan. 1 (1878) 462. – Type: *Beccari 3198* (K, holo), Malaysia, Sarawak, 1865–1868.

*S. radiatum* King, J. As. Soc. Beng. 64, ii (1895) 21. – Type: *King's Coll. 6001* (CAL, syn.; G, K, L, P), Malaysia, Perak, Gopeng, Larut, April 1884.

[*S. harmandianum* Pierre ex Laness., Pl. Util. Colon. Franç. (1886) 310, nom. nud.]

*S. indicum* var. *cochinchinense* Pierre, Fl. For. Cochinch. 5 (1897) t. 353A. – Type: *Pierre 1867* (P, holo; K, L), Vietnam, Baochang, July 1877.

*S. harmandii* Pierre, Fl. For. Cochinch. 5 (1897) t. 353B, excl. fol. (= *Aglaia sp.*). – Type: *Harmand 741* (Hb. Pierre 6319; P, holo), Vietnam, Con Son (P. Condor), Oct. 1876.

*S. vidalii* Merr., Philip. Govt Lab. Bur. Bull. 6 (1904) 8. – Type: *Merrill 1824* (PNH, lost, holo; B, lost, G, K), Philippines, Luzon, Rizal, Bosoboso, April 1903.

*S. harmsianum* Perkins, Fragm. Fl. Philip. (1904) 31. – Type: *Merrill 1824* (B, lost, holo; G, K, PNH, lost), Philippines, Luzon, Rizal, Bosoboso, April 1903.

*S. ledermannii* Harms in E. & P., Nat. Pfl. Fam. ed. 2, 19bI (1940) 172, 177, nomen; Bot. Jahrb. 72 (1942) 204. – Types: *Ledermann 6712, 6733, 6736* (B, lost), Papua New Guinea, Sepik, Hauptlager Malu, 22-23 March 1912; *Ledermann 10791* (B, lost), 31 Jan. 1913.

[*Hantol* Kamel, App. Herb. Luz. Philip. (1704) 54.]
[*S. domesticum* Rumpf, Herb. Amb. 1 (1741) 167, t. 64.]

This species embraces the cultivated fruit trees known as *sentul* (or variants) and *kechapi* (and variants) throughout western Malesia, and wild trees closely resembling them. The form known as *kechapi* in the narrow sense, i.e. with robust pubescent twigs, brown pubescent adaxial surfaces on the leaves, which are large and with many costae in the leaflets, is widely cultivated beyond Malesia, notably in Indochina (*S. indicum* var. *cochinchinense*), Mascarenes (*Trichilia venosa*), India, Hawaii and increasingly in Florida, where one of the forms, commonly grown at Manila and elsewhere in the Philippines, is known as 'Manila' which may serve as a cultivar name. This may be the form known as 'Bangkok', introduced from Thailand to Manila in 1949 (Ramirez, 1961) and compared with the less robust 'Native' which is probably the Red Sentol of Corner (Wayside Trees, 1940, 467), who notes that the tree has leaves which wither red, petals which are pale green; it has a sweet or sour fruit with a thick generally wrinkled or uneven pericarp and often rots on the tree. In the Malay Peninsula, it seems not to be wild, though *S. radiatum* from Perak corresponds to it (as presumably does *S. indicum* var. *velutinum*). Moreover, it seems to be the form originally designated *Melia koetjape, Sandoricum indicum* and *S. ternatum.* In the Malay Peninsula, the widespread wild tree or Yellow Sentol of Corner has smaller ± glabrous leaves, withering yellow, the leaflets with fewer costae, and pinkish petals, the fruits sweet-tasting with thinner smoother pericarp and falling when ripe. This intergrades with the trees known as *S. maingayi* (Malay Peninsula, Borneo), *S. glaberrimum* (Java), *S. nervosum* (Java), *S. vidalii* and *S. harmsianum* (based on the same gathering (!), Philippines) and *S. ledermannii* (New Guinea). Indeed, it extends further east than the cultivation of the tree. Confusion between *Trichilia nervosa* (*Sandoricum nervosum* (Vahl) M.J. Roemer) and *S. nervosum* Bl. by Ridley and others has meant that the latter name has often been given to the Red Sentul. Nevertheless, with all the variable wild material, which may, of course, include naturalized trees, it becomes impossible to distinguish the Red and Yellow Sentul in a clearcut way. Particularly difficult are a number of recent collections from Sumatra as well as the Malay Peninsula and Borneo. In the Philippines, Sulawesi and eastwards, the distinction is more clearcut and it may be tempting to speculate that the wild plant is more variable in western Malesia, where, moreover, all the other species of the genus are native, and that from those populations have been selected the forms which have been carried over Malesia and way beyond.

*Sandoricum serratum*, based on a cultivated specimen in England, is included here with some hesitation, though Hiern (1875) suggested such a disposition. Further support comes from the remarks of Adelbert (1948) who noted that he saw specimens with serrate leaves. Nevertheless, without a type it is difficult to be certain, for the description, which is meagre, could fit a number of genera in other families, notably Sapindaceae. *Sandoricum harmandii* to which Pennington & Styles (1975) draw attention is odd in having 1–5-foliolate leaves. In describing it, Pierre was hesitant, noting that the fruit and leaves came from separate trees and that the anatomy of the twigs did not match *Sandoricum* though the fruits certainly did. Pellegrin (1911) fol-

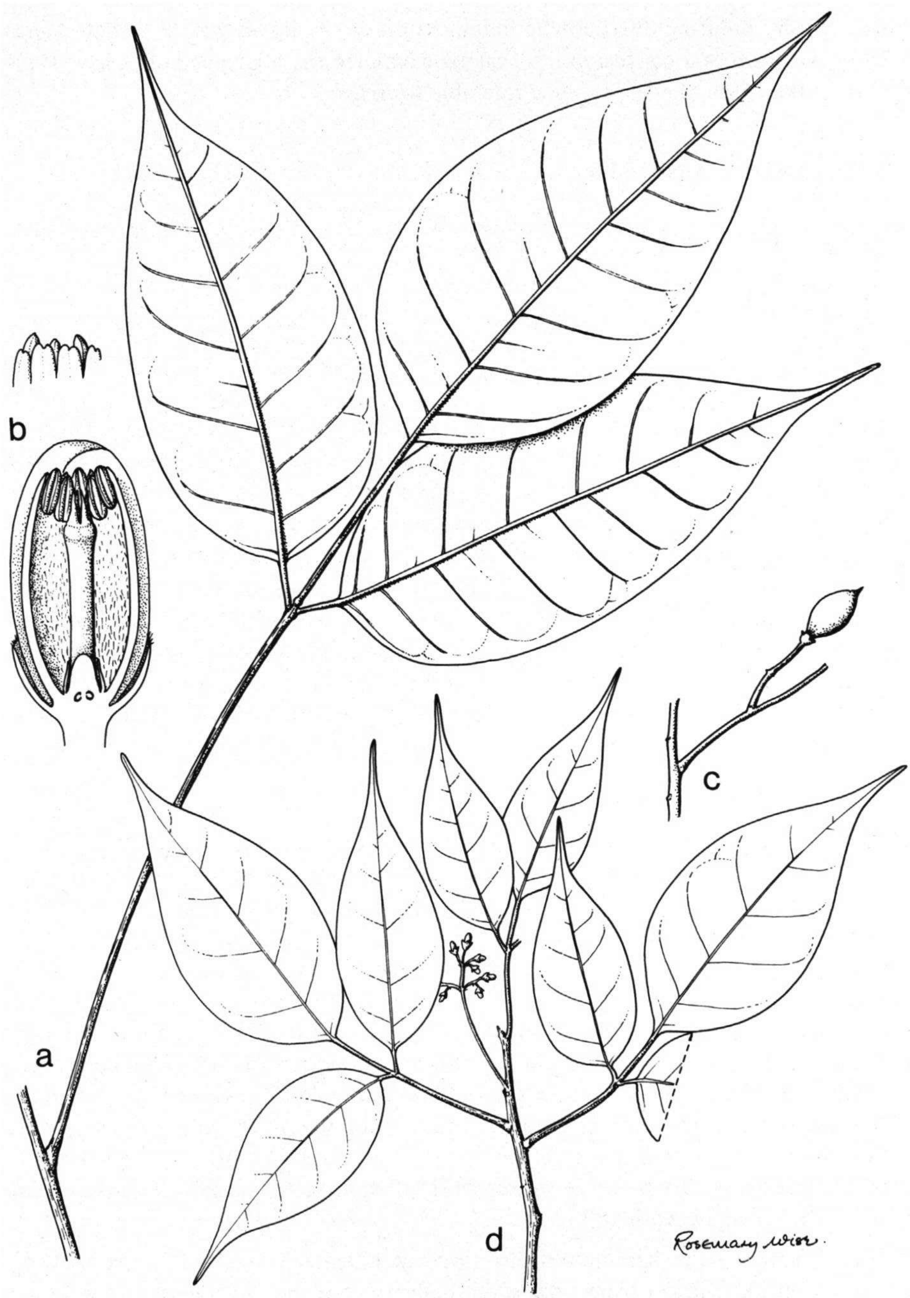



Fig. 1. *Sandoricum caudatum* Mabb. a. Leaf, × ½; b. flower, × 5; c. fruit (immature), × ½ (all from *Purseglove 4990*); d. flowering shoot with immature leaves, × ½ (from *Haviland 2851*).

lowed this by pointing out that the indumentum of the leaves was of stellate hairs. Clearly the plant is a confusion but, having examined the holotype at P, I have typified it on the fruits, the leaves being referable to *Aglaia*.

**3. Sandoricum borneense** Miq.

*S. borneense* Miq., Ann. Mus. Bot. Lugd.-Bat. 4 (1868) 33. – Type: *Korthals s.n.* (L, holo), Borneo, S. Tewe (c. 0° S, 115° E), Sept. 1836.

Distribution. Borneo.

**4. Sandoricum caudatum** Mabb., *spec. nov.* – **Fig. 1.**

Ab aliis speciebus *Sandorici* cognitis foliolis caudatis differt. *Arbor* ad 10 m alta. Truncus ad 15 cm diam., cortex laevis, cinerascens. Ramuli foliati circa 3–4 mm diam., glabrescentes non nisi ad innovationes fulvipubescentes. *Folia* ad 20–25 cm longa; petiolus circa 5–9 cm, complanatus, in sicco corrugatus, base tumida; foliola ovata, basibus cuneatis (plus minusve asymmetricis, base folioli terminalis excepta), apicibus longi-acuminatis (acumine ad 24 mm longo), nervis 8–10 utrinque, arcuatis, venatione brochidodroma; foliolum apicale 14–15.5 × 6–7 cm, lateralia 10–13 × 4–6 cm, rugulosa in sicco, petiolulis 6–9 mm (lateralibus) vel 4–5 cm (apicalibus). *Thyrsus* 4–7 cm longus, pauciramosus, axillis foliorum immaturorum ortus, ramis usque ad 2 cm longis, squarrosis, floribus duobus tribusve fasciculis praeditis, axibus puberulis, bractis 5–7 mm longis anguste lanceolatis puberulis, caducis, bracteolis minoribus atque una duobusve etiam pusillioribus adjecentibus usque ad articulationem pseudopedicelli saepe concomitatis; pedicelli circa 5–6 mm, pseudopedicellis circa 1–2 mm cum calycibus confluentibus. *Calyx* circa 2.5 mm longus, vadose campanulatus, plus minusve puberulus, pallide viridis, in 5 lobos plus minusve obtusos findens, margine ciliata. Petala 5, circa 4.5 mm longa (immatura), circa 2 mm lata, elliptica, eburnea, apicibus rotundis. *Tubus staminalis* extus glabratus, intus villosus, eburneus, margine irregulariter 10-lobata; antherae 10, plus minusve biseriatae, cum lobis alternantes, circa 0.75 mm longae, oblongae, parum exsertae. Discus circa 1.5 mm longus, glabratus, membraneus, ovarium amplectens, margine laciniata. Ovarium et stylus glabrata, lobis stigmaticis circa 1 mm longis. *Drupa* solitaria, minimum 5 cm longa, 3.5 cm diam., stipitata, rostrata (stipite usque ad 1 cm, rostro usque ad 6 mm), plus minusve longitudinaliter costata, luteofuscovelutina, calyce marcescente, pyrenis tribus quattuorve. *Semina* circa 16 mm longa, 9 mm lata (immatura), cotyledonibus in sicco rubellis. – Typus: *Haviland 2851* (K, holo; first record), Malaysia, Sarawak, 1st Division, 26 April 1893.

Distribution. Lowland dipterocarp forest and kerengas to 350 m in the 1st Division of Sarawak. Known from only seven collections, none of which has completely mature flowers or fruits. Other material seen: Bako National Park, Telok Delima, *Purseglove 4990* (K, L); Semengoh, *Anderson S 20298* (K), *Banyeng & Jugah S 26874* (K), *S 26261 & S 34218* (L); mile 25, Bau/Lundu Road, *S 26989* (L).

## 5. Sandoricum beccarianum Baill.

*S. beccarianum* Baill., Adansonia 11 (1874) 264 [N.B.: this part cited in Hist. Pl. 5 (1874/1875) 503]. – Type: *Beccari 3111* (FI, G-DC, K, P), Malaysia, Sarawak.
*S. emarginatum* Hiern in Hook. f., Fl. Br. India 1 (1875) 553. – Type: *Maingay 1478 (Kew Distrib. 331)* (K, holo), Malaysia, Malacca, 21 Dec. 1865.

Distribution. Coastal regions of Sumatra, Malay Peninsula, Borneo.

### *Species to be excluded from Sandoricum*

*Sandoricum pinnatum* Herb. Mus. Vind. ex Ettinghausen, Blatt-Skel. Dikot. (1861) 136, t. 54, f. 8, 9. – Type: from South America.
The pinnate leaves exclude it from Sandoriceae and the plant (sterile) probably represents *Trichilia* or *Guarea*, but the specimen cannot now be traced at W.


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